Low Density
Infill Housing Design Guidelines
for the Cloverdale Area Redevelopment Plan

Prepared for

THE CITY OF Edmonton PLANNING AND BUILDING

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I. Flood Protection Measures

The Cloverdale community, while not significantly affected, must address the issue of floodplain management. 35 of the 179 lots (19.5%) are either fully or partially between the floodway and the 1:100 year flood line. The design flood level has been designated at 622.0 by Alberta Environment. The floodway channel, within the 1:25 year flood line, is essentially within the CCRP (Capital City Recreation Park) boundary RDA (Restricted Development Area). Development is restricted within this area by provincial legislation and since this restriction is recognized in the Edmonton Land Use Bylaw as a land use restriction overlay, residential development in the floodway is thereby prohibited.

These designations of floodway and floodplain establish a two zone floodplain area in Cloverdale. CMHC Regulations for Building in a Flood Risk Area (NHA Document 5701) outline five basic methods of construction in flood prone areas:

1. Rock or earth fill can be used to raise the elevation of a building above the possible flood level.

2. The building can be raised on posts, piles or piers.

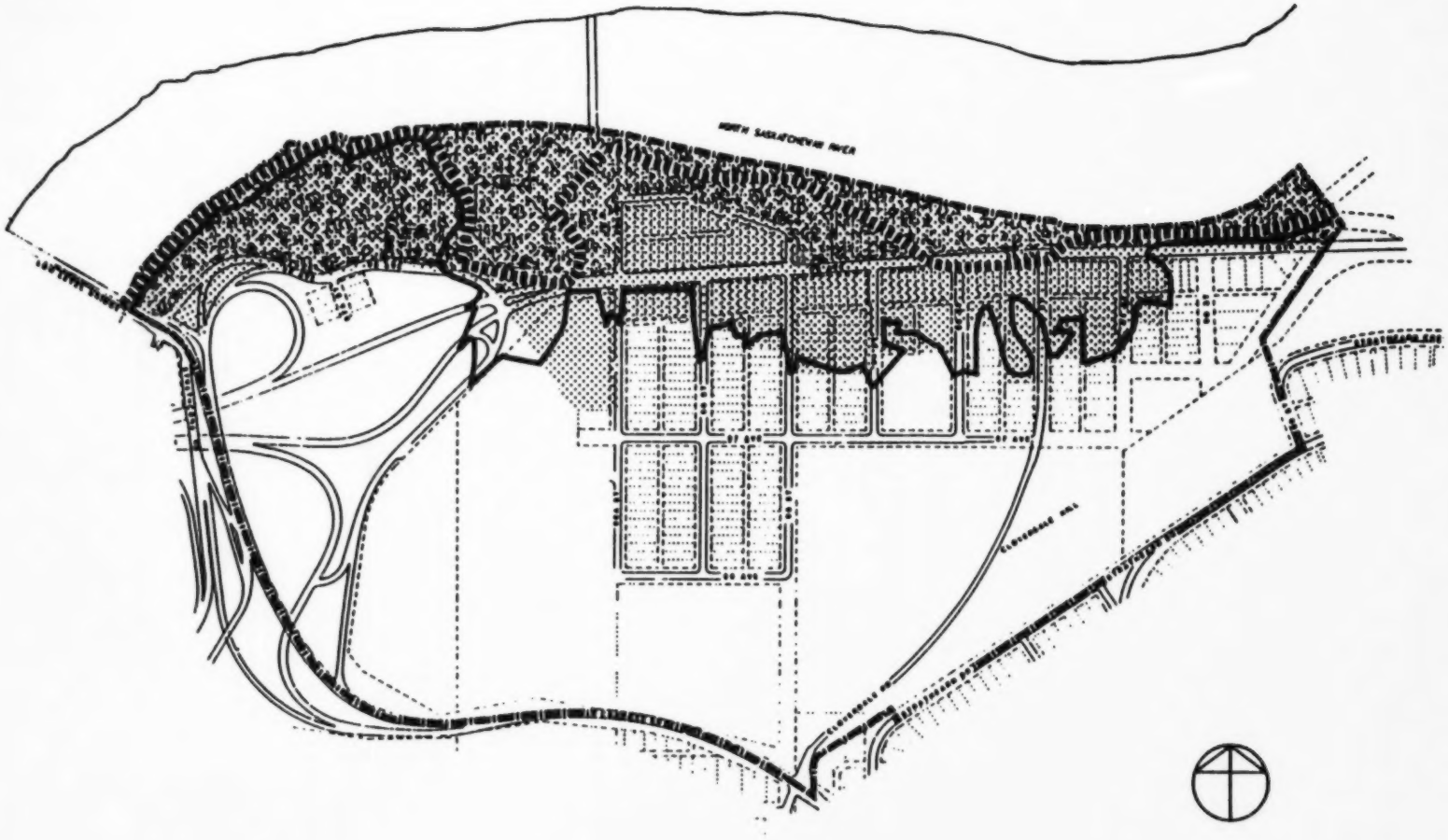
3. The building can be designed to allow the basement to be flooded, which equalizes water pressure on the foundation walls, and allows the occupants to remain in the dwelling, at least during the initial stages of the flood.

4. A berm or floodwall, the top of which is higher than the once-in-a-hundred-years expected flood levels, can be built to encircle a single building or group of buildings.

5. A building can be designed so that the basement is watertight, but is must be able to withstand the forces created by the surrounding floodwater.

Funding is not available under the National Housing Act (NHA) unless options 1, 2 or 3 are used. Berming requires the cooperation of all persons in a flood prone area and is only as effective as its weakest point. A building designed to resist hydrostatic pressure would be so expensive that few could afford it.

Option 1 Using rock or earth fill to raise the elevation of a building.
This option is only viable where a whole district can be raised with compacted fill. This includes roadways. Any existing vegetation would have to be destroyed. Building on fill also requires special foundation design. For these reasons, raising the elevation of Cloverdale is not considered a viable option.



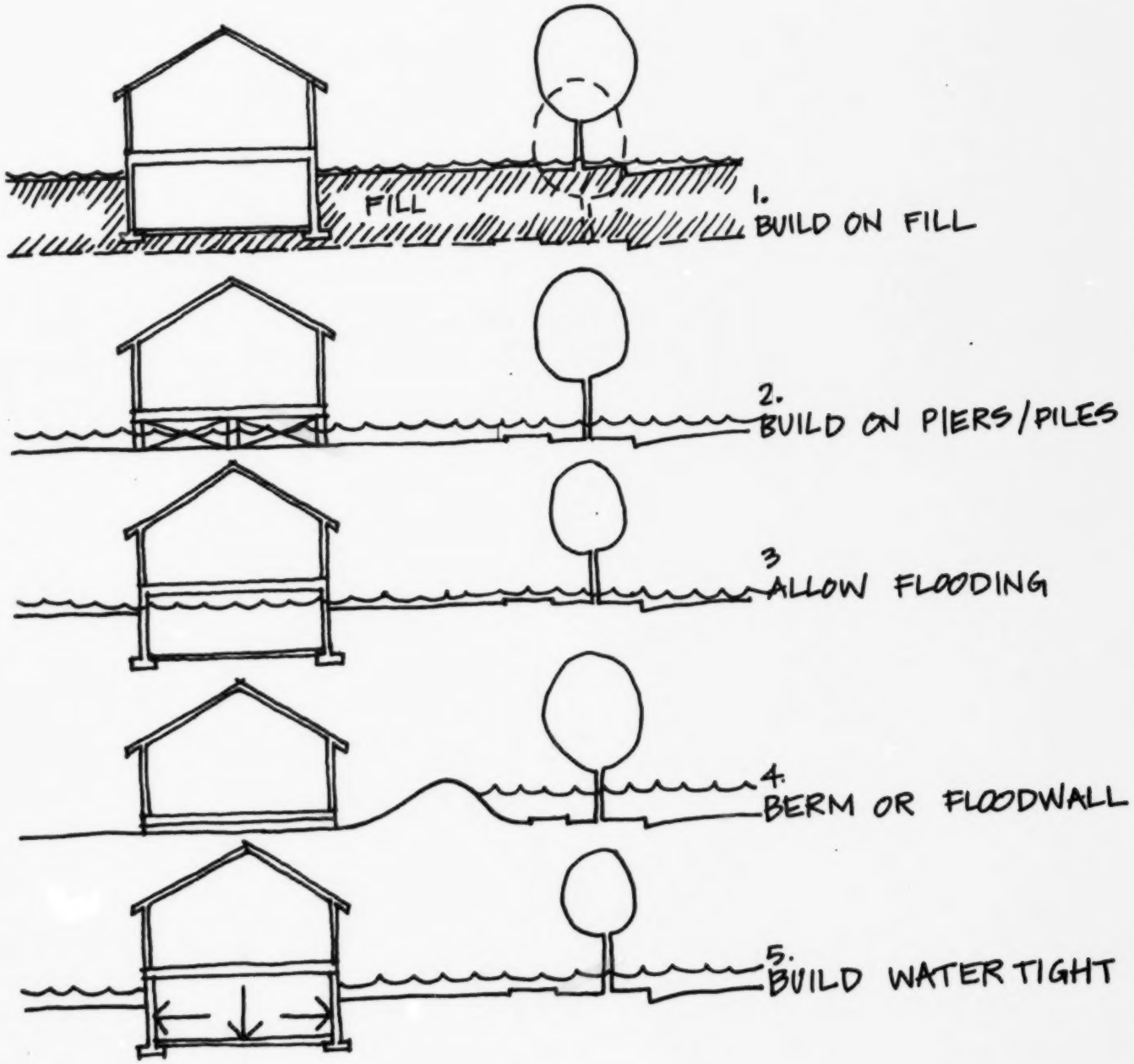
1:25 Year Flood Line

Capital City Recreation Park Restricted Development Area

1:100 Year Flood Line

Lots Affected by Floodplain Regulations

Cloverdale


FILL
1.
BUILD ON FILL
2.
BUILD ON PIERS/PILES
3
ALLOW FLOODING
4.
BERM OR FLOODWALL
5.
BUILD WATER TIGHT

Option 2 Raising a building on posts, piles or piers.

For obvious aesthetic reasons, this option would result in a housing form out of character with the existing neighbourhood of Cloverdale. In addition it is a solution better suited to areas constantly exposed to flood risk, unlike the North Saskatchewan Valley.

Option 3 Allowing the basement to be flooded.

Perhaps the most realistic approach to flood deign is to minimize damage, while allowing the forces of nature to run their course. Water pressure can be equalized within and without the building during a flood by deliberately allowing the basement to be flooded. The following requirements will enable the house to withstand the ravages of flooding and be reasonably easy to restore to dryness, cleanliness and soundness after the flood.

A. Backfill

1. Backfill must be placed in accordance with Subsection 12.C of Residential Standards 1980.

2. Backfill must be graded at least up to the design flood level at the exterior of the foundation wall.

3. Backfill must be graded away from the foundation at a slope not exceeding 1 in 30 for a distance of at least 4.5 metres, beyond which the slope can be increased to 1 in 4 down to the original grade.

B. Footings and Foundations

4. Footings and foundation walls must be cast-in-place concrete.

5. Footings, foundation walls and floor slabs-on-ground must be designed to resist all the effects of loads and other influences that might be expected during a flood, including hydrostatic pressure, and must satisfy the requirements of Part 4 of the National Building Code of Canada 1980. The designer must be a professional engineer or architect skilled in such design and licensed to practise under provincial or territorial legislation.

6. The clear height from the top of the basement concrete slab-on-ground to the underside of the first storey floor system, including beams, must be not less than 1930 mm.

7. Basement or cellar walls must have at least two openable windows. These must be on opposite sides of the building. The top of the window sills must be no higher than 150 mm below grade.

8. Basement or cellar walls and floors must not have any finishing materials covering the concrete.

9. Basements must not contain habitable space, or be used for the storage of immovable objects or hazardous materials that are buoyant, flammable, explosive or toxic.

10. Foundation insulation must be applied to the exterior of the walls and be fastened to prevent detachment during flooding.

C. Flooding Construction

11. All ground within the foundation walls must be covered by a concrete slab constructed in accordance with Article 16.F.1 of Residential Standards 1980.

12. The top of a structural slab-on-ground supporting habitable portions of a building must be at least 300 mm above the design flood level; a statement to this effect has to be contained in the surveyor's certificate submitted to CMHC.

13. Load-bearing floor slabs-on-ground must be designed in accordance with Part 4 of the National Building Code of Canada 1980; the designer must be a professional engineer or architect skilled in such design and licensed to practice under the appropriate provincial or territorial legislation.

14. The underside of floor joists and sill plates supporting the habitable portions of a building must be at least 300 mm above the design flood level; a statement to this effect has to be contained in the surveyor's certificate submitted to CMHC.

15. The underside of wood beams supporting floors must be at least 300 mm above the design flood level.

16. Columns supporting floor loads must be steel, as is required in Subsection 17.C of Residential Standards 1980.

17. Load-bearing walls constructed below the design flood level must be cast-in-place concrete.

D. Anchorage

18. Wood and steel frame buildings must be anchored to the foundation to prevent the unit from floating off the foundation should the design flood level be exceeded.

19. Exterior walls built on floor slabs-on-ground must be anchored according to Article 23.F.2 of Residential Standards 1980.

20. First-floor joists must either have the ends embedded in the concrete foundation or the header joist mechanically fastened to the sill plate anchor bolts, or employ some other system providing equivalent protection.

E. Basement or Cellar Drainage System

21. A covered sump pit with an automatic submersible pump must be provided in all basements or cellars. Such a unit may be required if the normal water table is high; in a flood situation it will keep the basement relatively free of water until it is purposely flooded.

22. The outflow pipe must discharge above the design flood level.

23. A separate electrical circuit must be provided for the sump pump, and the operating switch must be located above the design flood level. Before the flood waters reach the basement window level, the sump pump can be shut off at the electrical service box, and the pump disconnected and stored above the flood level.

24. Granular material under the basement or cellar slab must be graded so that the entire area is drained to the sump pit.

25. Basement or cellar slabs must have a positive slope to the floor drain.

26. The sump pump may be connected to a municipal storm sewer but must not be connected to a municipal sanitary sewer system. When the sump is connected to the storm sewer and when the building's sanitary drains are connected to municipal services, backwater valves should be installed to prevent back up into the basement.

F. Measures to Continued Occupancy

27. Units serviced by drilled wells must either have the required well casing extend upwards for at least 150 mm above the design flood level if the well is vented, or have the well casing sealed at the top.

28. Waste connections for plumbing facilities must not be installed below the design flood level.

29. Central heating units, such as oil, gas or electric forced-air furnaces, including all ductwork and serviced water heaters, must not be installed below the design flood level.

30. Electrical service panels must be located above the design flood level. Electrical circuits servicing areas below the design flood level must be on separate circuits, and be capable of being disconnected.

G. Summary

1. Cast-in-place concrete designed by a professional engineer or architect.

2. Foundation insulation on exterior side.

3. Frame buildings adequately anchored to concrete foundation wall.

4. Electrical panel and heating units above flood level.

5. Underside of floor 300 mm above design flood level.

6. Openable basement window not higher than 150 mm below grade.

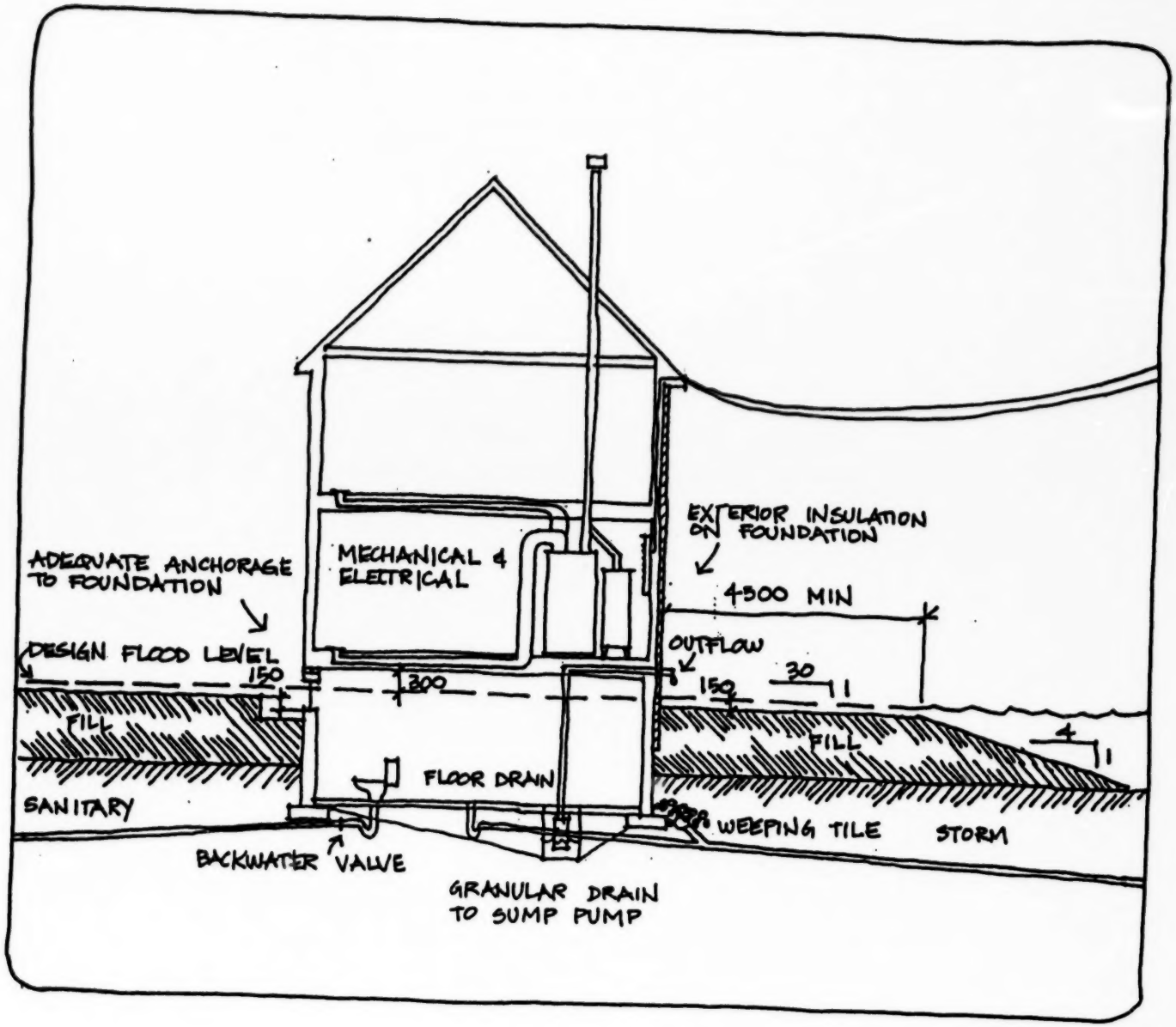
7. Basement wall and floor unfinished.

8. Basement drainage not connected to municipal sewage system.

9. Well casing extending 150 mm above the design flood level.

10. Finished grade elevation at least as high as the design flood level.

While these regulations are thorough and complete and result in construction which can withstand flooding and residences which can continue to be occupied during a flood and can be easily restored after inundation, they must be considered optimal. Adjustments must be


ADEQUATE ANCHORAGE TO FOUNDATION
DESIGN FLOOD LEVEL
150
300
MECHANICAL & ELECTRICAL
EXTERIOR INSULATION ON FOUNDATION
4500 MIN
OUTFLOW
150
30
1
4
1
FILL
FILL
FLOOR DRAIN
SANITARY
WEEPING TILE
STORM
BACKWATER VALVE
GRANULAR DRAIN TO SUMP PUMP

made acknowledging that new construction is occurring in an established neighbourhood. Floodplain regulations in an infill area must address the issue of compatibility. In addition we must accept the fact that despite the best intentions of such regulations, we are nevertheless willing to compromise and inhabit an area below the flood line, finishing the interiors and accepting the damages and inevitable clean up after a flood.

It is with these issues in mind that the CMHC measures must be considered recommended guidelines and not hard and fast regulations if NHA funding is not a consideration.

Recommended Requirements for Building in Flood Risk Infill Areas in Cloverdale

A. Flood Protection

1. Foundations must be constructed of cast-in-place reinforced concrete designed by a professional engineer or architect and frame buildings must be adequately anchored to these foundation walls.

2. The underside of the first floor and any associated structure (i.e. beams) must be 300 mm (12") above the design flood level.

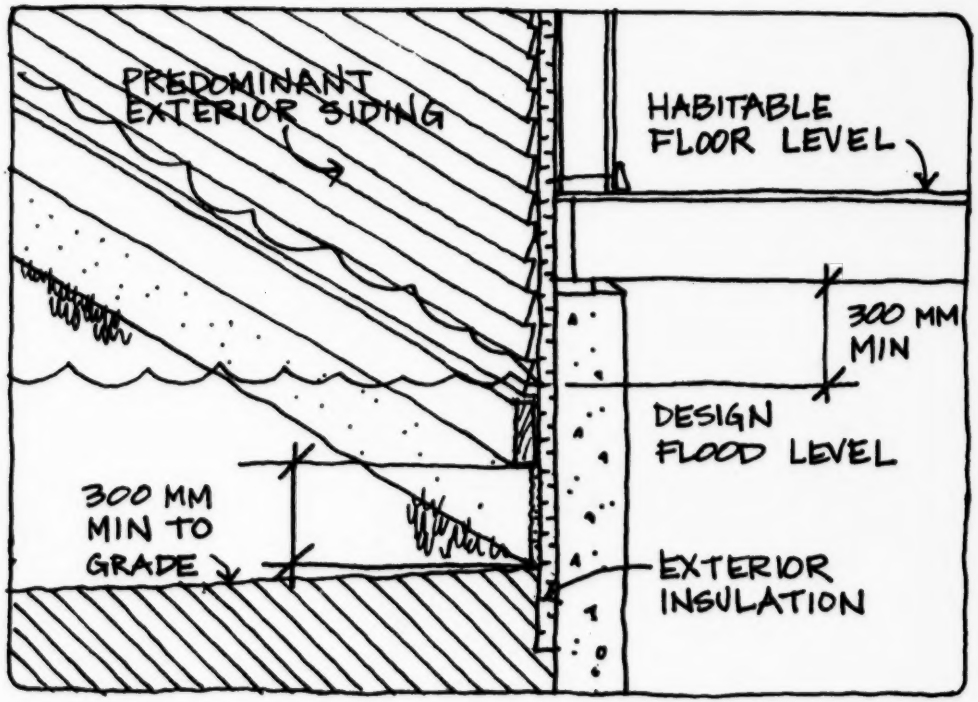
3. Electrical panel and heating units must be above the design flood level.

4. There must be two openable windows on opposite wall of the basement, with sills no higher than 150 mm below grade.

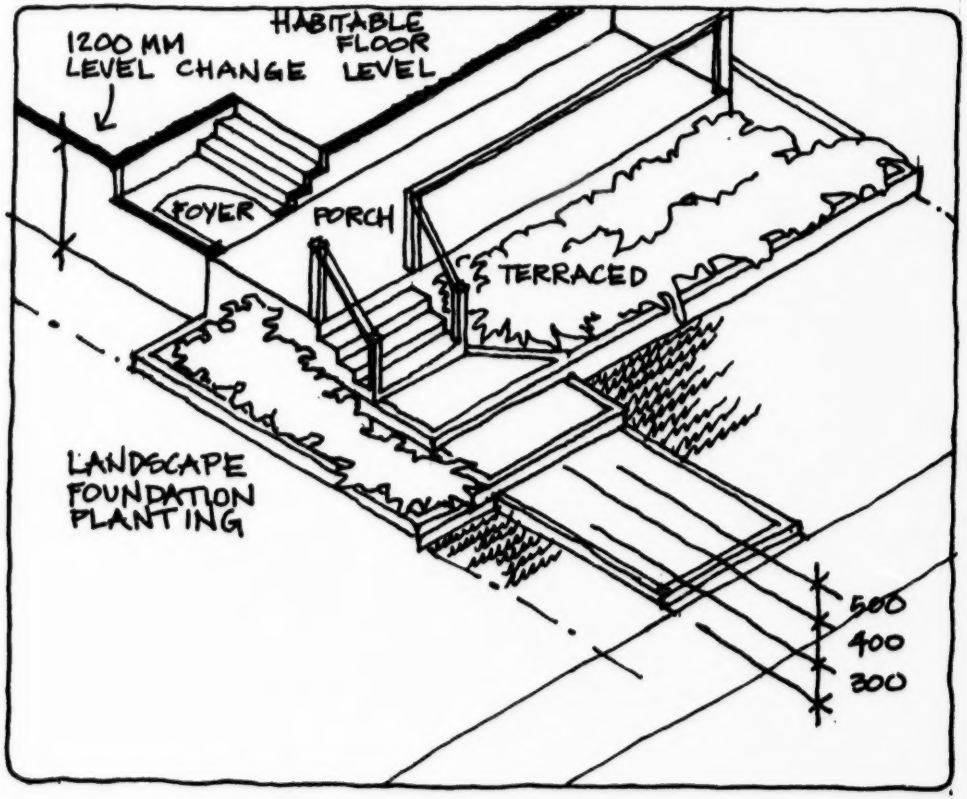
5. Basement drainage must not be connected to the municipal sanitary sewer system and backwater valves should be installed in sanitary drains located on the lower level to prevent back up into the basement.

B. Compatibility

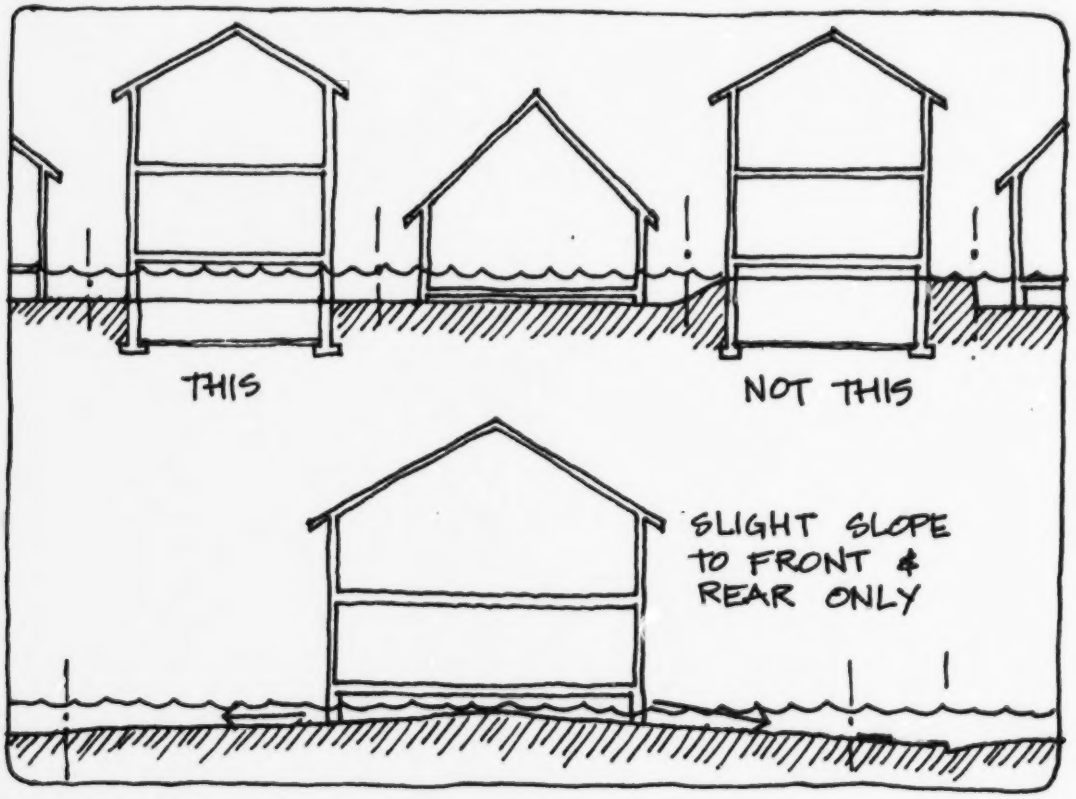
1. Predominant exterior cladding must extend to within 300 mm (12") of grade on all sides of the building.



2. Where the first floor is more than 900 mm (36") above grade the elevation difference should not be abrupt but should be split by means of landscape terracing, exterior stairs, interior level changes such as sunken foyers, or combinations of all of the above.



3. **Finish grade elevations should not be raised on side yards particularly on minimum setbacks (1.2 m). Drainage must be contained on the site, sloping towards front and rear only.**



4. Building heights shall be measured from the existing grade and shall include the height differential required for flood protection.

C. Use of Flooded Levels

1. Basements must not be used for the storage of immovable objects or hazardous materials that are buoyant, flammable, explosive or toxic.

2. Basements should not contain the primary sleeping quarters of the residence or a kitchen.

3. Any interior improvements to the basement level subject to flooding shall be at the owner's risk and costs incurred in cleaning and restoration shall be the responsibility of the owner.

II Land Use Guidelines

Cloverdale, both historically and today, is a "village" of modest homes. Its previous industrial base has been replaced with city-wide facilities such as the Bennett Environmental Education centre, the Muttart Conservatory and the Edmonton Ski Club. It is these amenities and its location in a park setting adjacent to the Capital City Recreation Park and the North Saskatchewan River which will assure Cloverdale's continuance as a desirable place to live. Whether it continues to be a village of modest homes or a gentrified enclave for the affluent will be determined by the land use guidelines adopted.

Exclusivity can be achieved by zoning the area to accommodate homes on large lots. On the other hand a wide range of residents can be attracted by introducing land use bylaws which allow for a variety of housing forms and tenures. In order to protect the scale and fabric of the area, guidelines must be incorporated which direct the transformation of Cloverdale

The areas in Cloverdale proposed for low density are currently districted RF3. The general purpose of this category is to provide a district primarily for single detached and semi-detached housing while allowing small scale conversions and infill redevelopment to housing forms containing up to four dwelling units per building.

Because this category is intended for general use throughout the city, special dispensation has been made for older areas such as Cloverdale through Section 51.2. This clause permits development of the narrow (10.06 m, 33'0") lots of Cloverdale.

While minimum areas and dimensions can be relaxed to allow single detached and semi-detached dwellings, the larger than average lot areas in Cloverdale could accommodate, based on site area alone, up to four units on two properties. Site widths and frontages however discourage these discretionary uses except on corner sites. The scattered nature of vacant lots in the area and the 10.06 metre of 33 foot width would make resubdivision difficult. As a consequence, even semi-detached dwellings are discouraged since two lots (20.32 metres or 66'0") would be required for this permitted use. Given that the minimum lot length is 39.62 metres (130'0"), all that should be necessary to develop a duplex or semi-detached building of two dwelling units is 11.8 metres or 38.7 feet while the minimum site width required is 13.5 metres or 44.3 feet.

The result of the RF3 zoning regulations and the Section 51.2 exception as it applies to Cloverdale is basically that:

1. Single detached redevelopment can occur on individual lots but cannot be controlled because it is a permitted use.

2. Semi-detached redevelopment can occur on two lots but likewise cannot be controlled because it is a permitted use.

3. Semi-detached redevelopment could occur on resubdivided lots of 13.5 metres (44.3 ft.) minimum width and on the trapezoidal lots situated at the northern ends of the low density blocks. As this is also a permitted use, it cannot be controlled.

4. Duplexes, row houses of both three and four units (corners only), apartment buildings and stacked row housing buildings of up to three units (4 unit development is 2.8 m^2 short of the area requirement) can occur on two lots and would be subject to design control because they are discretionary uses.

In summary, the existing zoning favours single family infill dwellings on single lots but allows for no design control to ensure compatibility with existing housing.

It is clear that if a variety of housing forms is desired, the existing land use category is inadequate. It is equally clear that the compatibility of the permitted use, single detached housing, cannot be ensured by use of guidelines.

Proposed Guidelines - Revisions and Additions

1. The only permitted use should be Single Detached Housing. This revision would allow design control to be exercised over all but single detached housing.

2. The site area requirements for all housing types should be reduced to 195 m^2 to allow two units to be developed on a single lot with dimensions of 10.06 m x 39.62 m, (33.0 ft. x 130.0 ft.), to a maximum of four dwelling units per building on two such lots.

3. The minimum site width should be provided as follows:

   a) 10 metres for each single detached dwelling;
   b) 10 metres for each two semi-detached or duplex dwelling;
   c) 20 metres for each three row house dwelling; and,
   d) 30 metres for each four row house or stacked row house dwelling except that only 20 metres should be required where the frontage is a corner lot flanking a public roadway other than a lane.

4. Minimum site depth should be 30 metres (98.4 feet).

5. Maximum height should not exceed 10 metres (32.8 ft.), nor 3 storeys.

6. Site coverage should not exceed 45% with a maximum of 35% for a principle building and a maximum of 15% for accessory buildings.

7. The minimum front yard should be 4.5 metres but must be within 10% of the adjacent front yards.

8. Minimum rear yard for a principle building should be 7.5 metres except in the case of a corner site, where it should be 4.5 metres (14.8 ft.) and for accessory buildings a minimum of 1.2 metres (3.9 ft.).

9. Side yards should be established on the following basis:

   a) Side yards should total at least 20% of the site width, but the requirement should not be more than 6.0 metres (19.7 ft.), with a minimum side yard of 1.2 metres (3.94 ft.) except that the minimum side yard for buildings over 7.5 metres (24.6 ft.) in height should be 2 metres (6.6 ft.).

   b) On a corner site where the building fronts on the front yard, the minimum side yard abutting a flanking public roadway other than a lane should be 20% of the site width, to a maximum requirement of 4.5 metres (14.8 ft.).

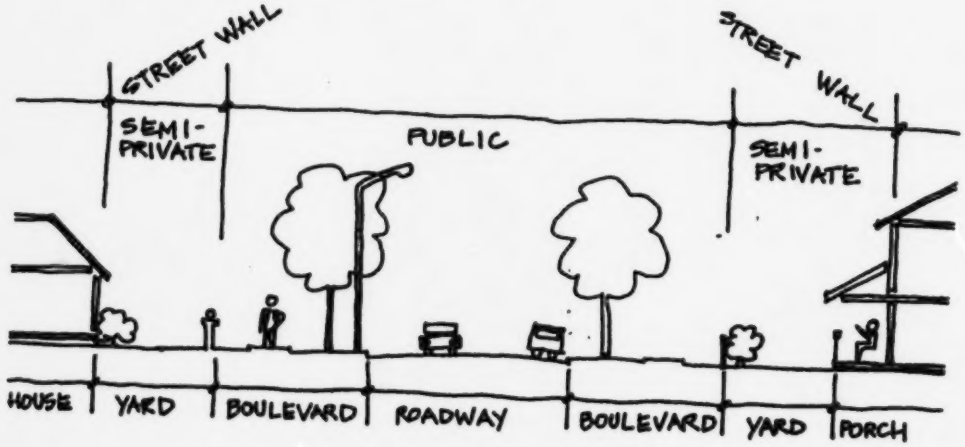
   c) On a corner site where the building fronts on a flanking public roadway other than a lane, the minimum side yard abutting the flanking public roadway should be 4.5 metres (14.8 ft.).

10. Separation Space should be provided between two or more dwellings or portions thereof on the same site in accordance with Section 58 of this Bylaw.

These revisions would allow for a greater degree of flexibility in the location of dwellings on the site.

The above revisions are very similar to the proposed RF2A guidelines currently under review for the Scona East Area Redevelopment Plan and consideration should be given to adopting same. (See Appendix I Scona East.)

If, on the other hand, new development in Cloverdale is to maintain the status quo, that is to redevelop similar to how it has been since its inception, then the current regulations seem adequate, with the exception that heights should be reduced to 7.5 metres (24.6 ft.) or 2 storeys.



III Criteria for Infill Development

Modification of existing land use categories or rezoning to another land use category can only affect the general form of development: its density, internal massing and indirectly or unofficially its occupant type (i.e. renters, owners). Clearly, additional regulations or guidelines are necessary to ensure that both permitted and discretionary uses are compatible with existing development. The following are objectives for these guidelines:

1. To introduce variety to the streetscape and housing types ensure that development of vacant lands and redevelopment of existing houses complements the existing and proposed development.

2. To re-establish the street wall and privacy zones that existed in the neighbourhood before demolition of many of the homes.

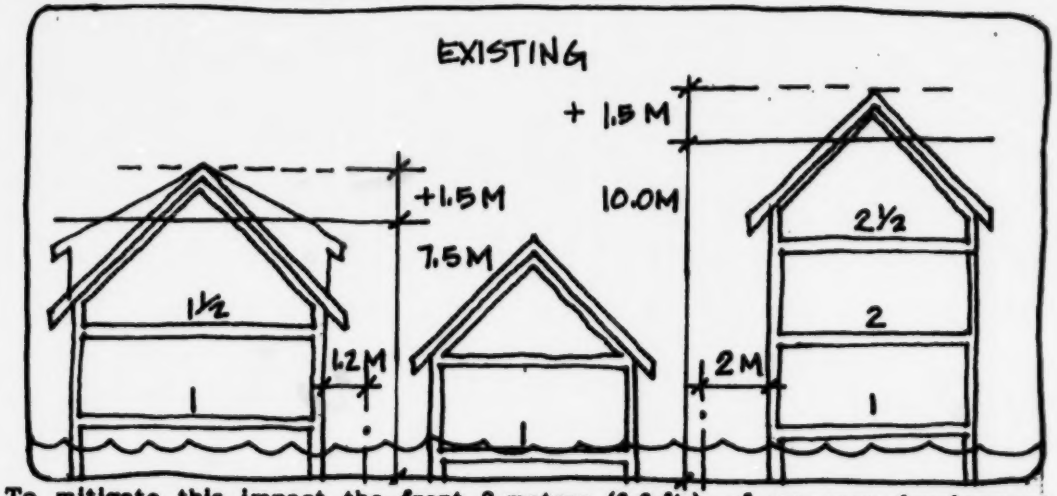
3. To ensure that new development respects the scale and siting of existing housing stock.

4. To establish a rhythm or interval of development that is consistent with the narrow lot width that exists.

The eclectic nature of Cloverdale housing, ranging from shanty bungalows to masonry two storeys, makes it very clear that no period style should be imposed. New developments, due to changing technologies and life styles, will differ from that which exists. The primary objective therefore in Cloverdale, must be to ensure that redevelopment respects its neighbours. To this end the following should be considered:

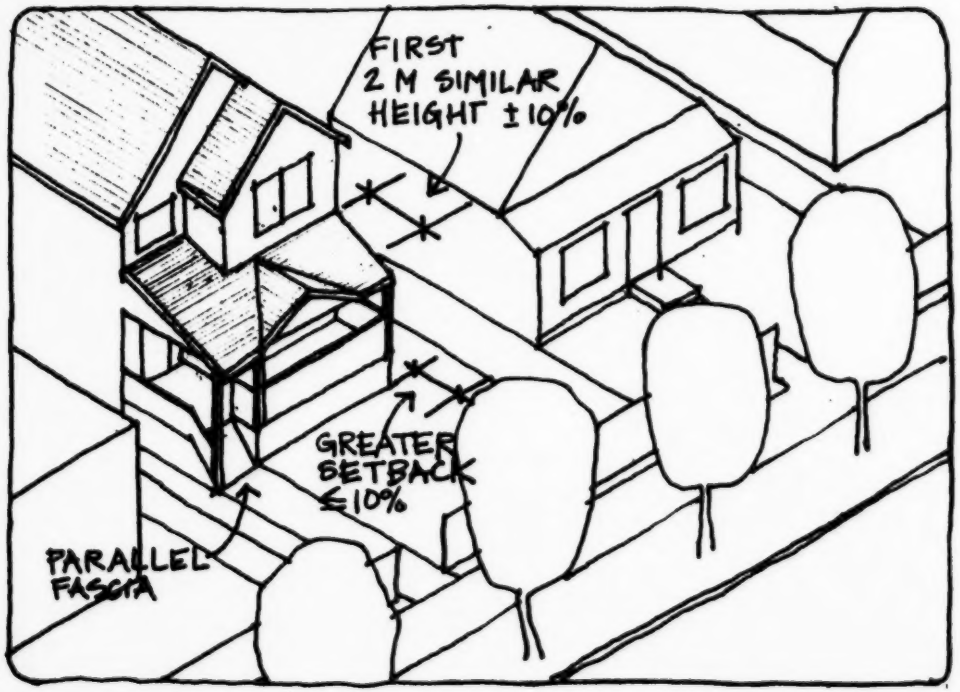
1. **Height Compatibility**

Since the predominant massing in Cloverdale is 1-1½ storeys, redevelopment of an adjacent lot to the maximum of 10 metres (plus 1.5 metres if roof slopes exceed 20 degrees) will have a significant impact.



To mitigate this impact the front 2 metres (6.6 ft.), of any new development or renovation/addition to an existing home should not exceed the height of the adjacent dwelling, or average of dwellings on both sides, by 10%. This can be realized with a front porch roof, building to a maximum height only at the rear of the dwelling, or orienting the roof slope such that the lowest fascia height faces and is parallel to the street.

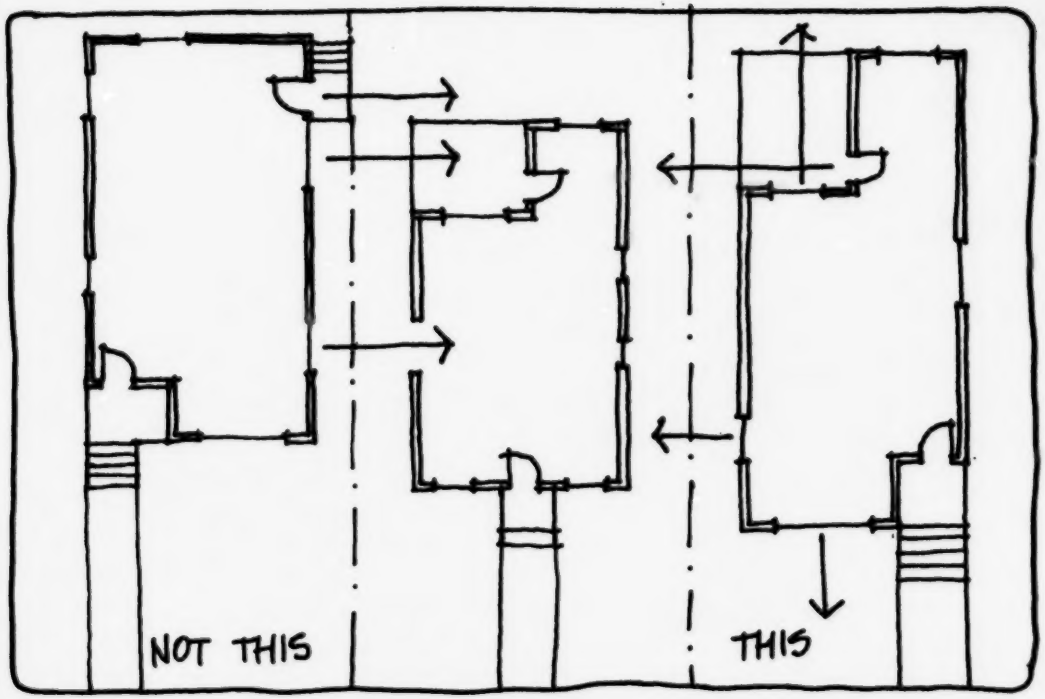
If a building exceeds the height of adjacent dwellings, the front yard should be greater (not less) than the adjacent front yards by a maximum of 10%.



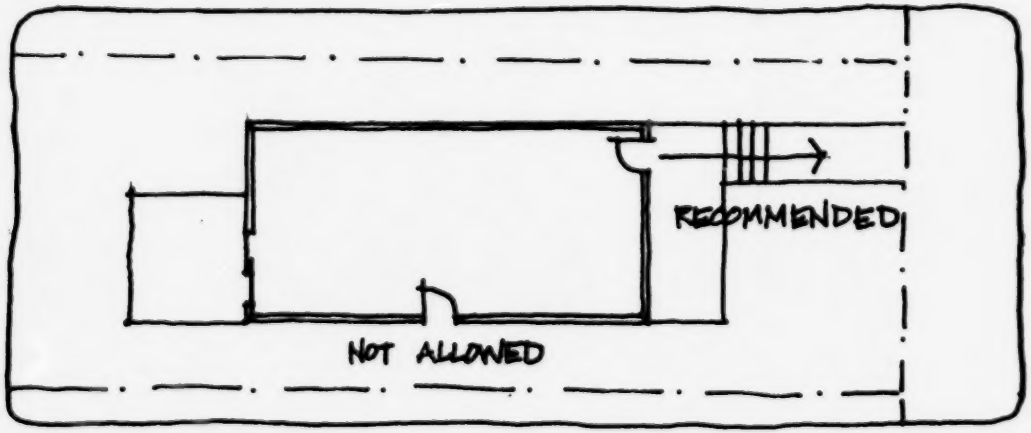
2. **Privacy**

Since new development in Cloverdale will inevitably be dwellings of greater area, they will overlook existing homes and yards.

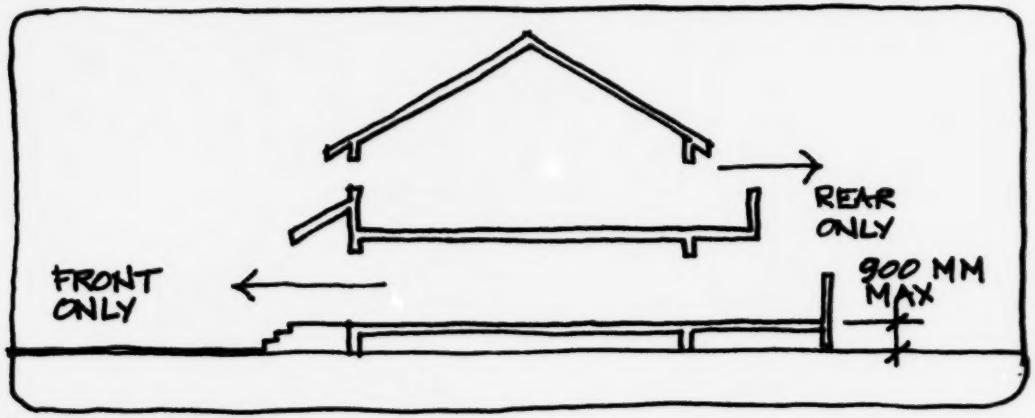
To lessen this impact, new developments should minimize window openings on side walls. These openings should be oriented or placed such that they respect the location of windows and the location of outdoor amenity spaces of adjacent properties.



No entrance to any new dwelling unit should be placed on the major side walls and the primary entrance should be oriented generally towards the front of the property and the street.

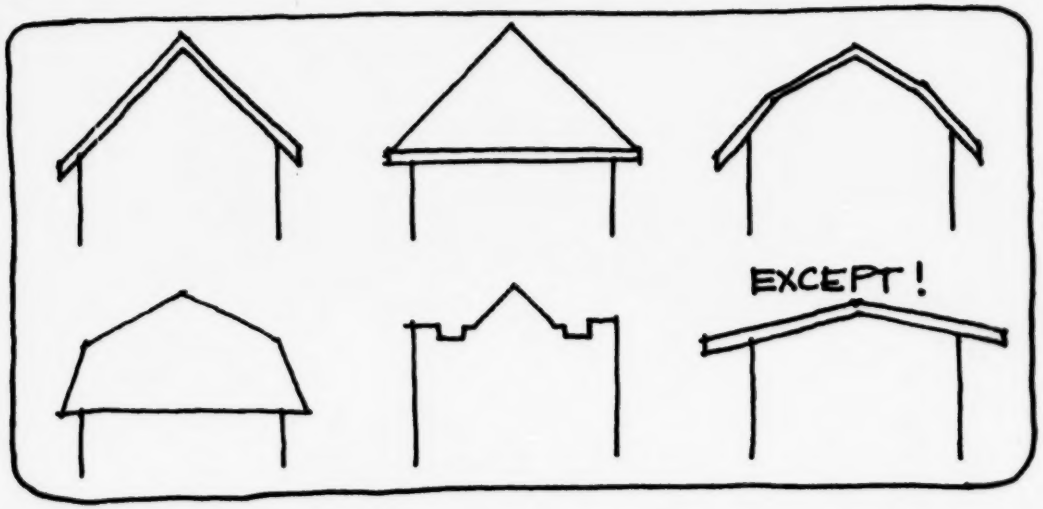


The height of any raised decks should not exceed 900 mm (3 feet) above grade. Second storey balconies shall only be located on the front and rear of a new building.



3. Materials and Finishes

To be totally consistent with the eclecticism of Cloverdale, no restriction should be imposed on exterior cladding. However, since the existing structures date back as far as the late 1800's, choice of cladding materials should not include cedar or any other materials and colours (such as the earth tones) which do not respect the inner city nature of Cloverdale.

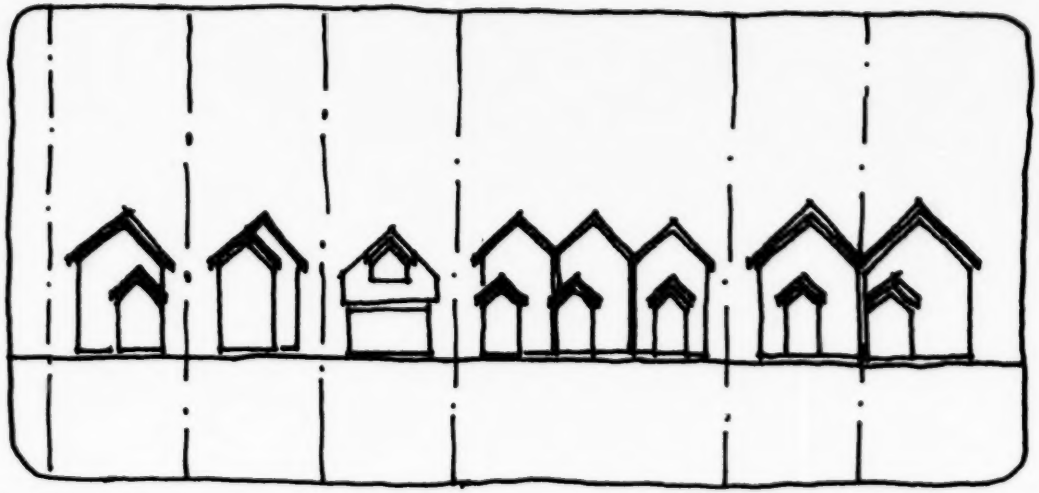


4. **Roof Form**

Every possible roof form exists in Cloverdale, from flat to steeply pitched, and this variety should be encouraged. Low sloped roofs with large overhangs should be avoided.

5. **Unit Identity/Rhythm**

Each unit of a semi-detached, duplex or row housing building should be articulated as an individual unit with a prominent street oriented entryway on the building wall facing the street. Separate and/or secondary roof forms, dissimilar facades, and different cladding materials, should all be used to define separate units and establish a 10 to 13 metre interval of facade corresponding to the characteristic frontage of the area.



Identical unit types or models should not be allowed within three lot widths of each other, and where they are situated in close proximity they should incorporate varied facades, roof forms, colour or cladding to mitigate their similarity.

6. **End Lots/Parcels**

Within the Cloverdale area, there exist a number of special condition lots and/or parcels. All of these exist as end conditions on flanking public roadways, either a street or a lane.

a) The street corner lots facing 97 Avenue will be an integral part of the proposed Community Street, both as street wall and in establishing an activity, address, and focus to the avenue and the corner of every cross street.

Consolidation of the end two lots of each block with 97 Avenue as a flanking roadway should be undertaken. Re-subdivision of these parcels into fee simple lots fronting on the Avenue will be encouraged, thereby allowing row or semi-detached type development to occur fronting on 97 Avenue.

Any form of development which occurs on the corner, however, must consider the following:

Parking
Parking, where possible, should have its access off the lane. If it does not, it should be to an attached (drive under) garage. Care and consideration must be taken to minimize the impact of these garages on the planting interval of 97 Avenue. The impact of garage doors should be minimized by use of recesses or overhangs, and by using two smaller doors instead of large double doors. There should be a minimum of 5.0 metres (16.4 ft.) between the garage door and the back of walks, not only to minimize the impact, but also to provide additional temporary tandem parking.

Corner Articulation
Any dwelling located on a street corner should have its building corner articulated with some special design element. To accommodate this, yard relaxations of up to 1.2 metres (4 ft.) should be allowed.

The principal entry of a dwelling unit or units located on a street corner lot should face the flanking roadway.

Facade treatment on a corner site should respect the dual frontage with windows, projections and roof forms (primary and secondary).

b) The lane corner lots facing the 98 Avenue lane will require special consideration in light of their adjacency to the medium density back yards and commercial development. The building setback from the lane of 98 Avenue could be as little as 2 metres (6.6 ft.) with off-lane parking, access to structured parking along the lane, and commercial loading and garbage storage.

In addition, these lots are trapezoidal in shape, and often too small in area and frontage to develop.

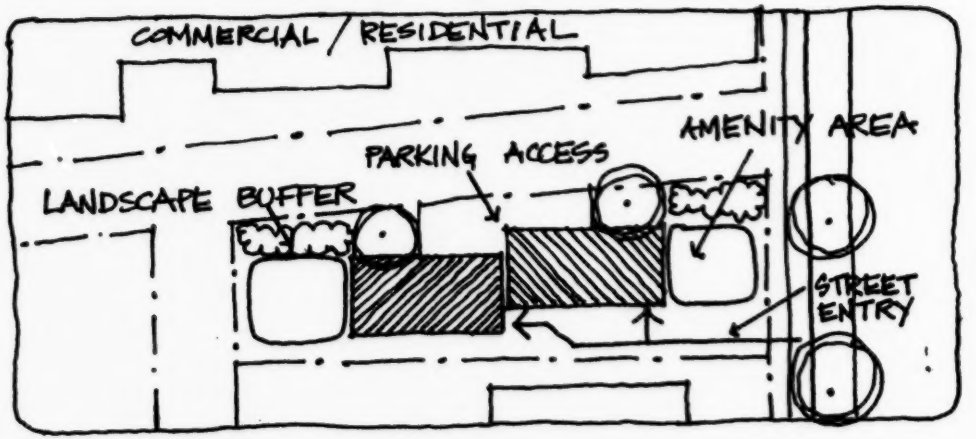
Consolidation of many of the end two lots of each block with the 98 Avenue lane as a flanking roadway should be undertaken to ensure developability.

Development should occur according to the following guidelines:

Units should generally be oriented towards the south, with minimum setbacks, window openings and amenity spaces facing the lane to the north.

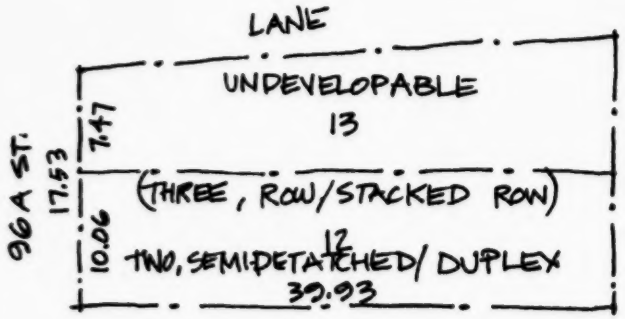
Parking and/or access to attached garages should be off either the rear lane or the flanking lane.

Use should be made of the trapezoidal lot shape to provide for landscape buffers between the activities and uses north of the lane and the residential and amenity uses on the sites.

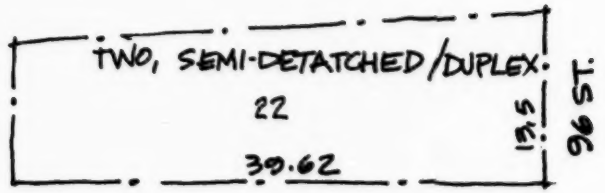


The development of these lots is limited to single detached duplex and three unit stacked town houses (some will require consolidation with adjacent lots to allow any development).

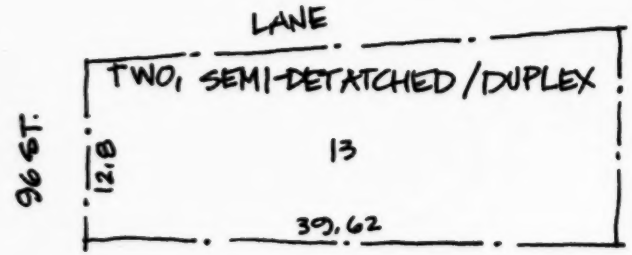
The following is a summary of the north end lot capabilities indicating frontage, area, allowable density and maximum recommended number of units and unit type. It should be noted that the widths of some lot frontages are deficient, but areas are adequate for the number of units recommended.



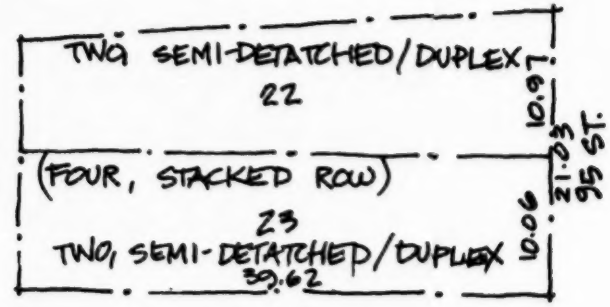
350.0 m^2 + 195 = 1.80 units
401.7 m^2 + 195 = 2.06 units
751.7 m^2 + 195 = 3.85 units



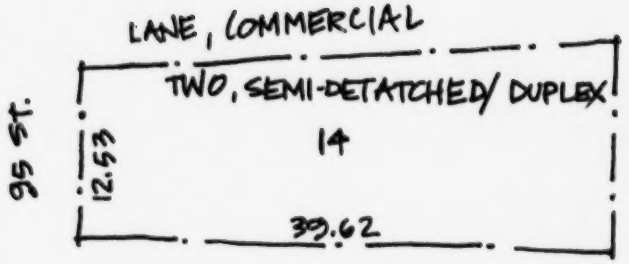
480.0 m^2 + 195 = 2.46 units



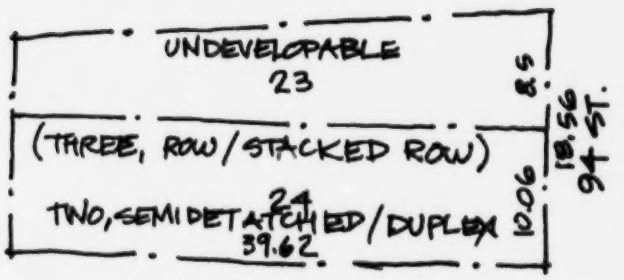
561.8 m^2 + 195 = 2.88 units



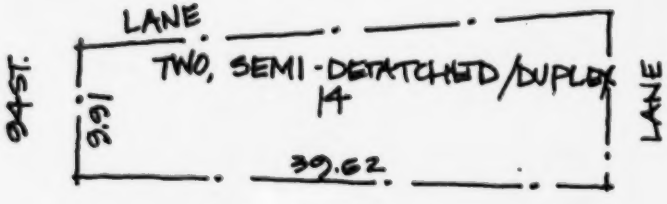
397.8 m^2 + 195 = 2.04 units
398.6 m^2 + 195 = 2.04 units
796.4 m^2 + 195 = 4.08 units



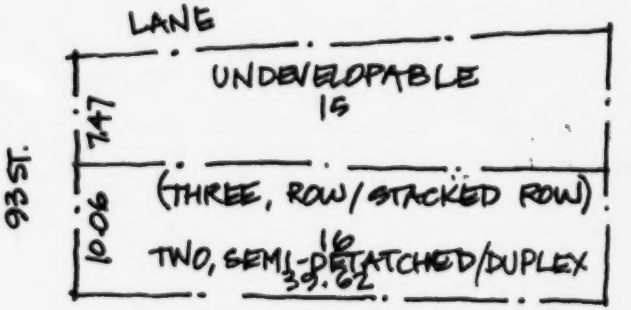
551.9 m^2 + 195 = 2.8 units



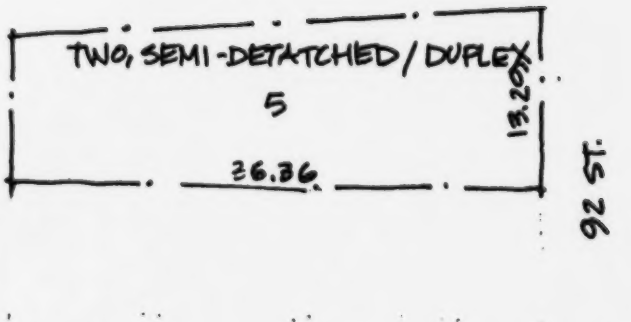
281.3 m^2 + 195 = 1.44 units
398.6 m^2 + 195 = 2.04 units
679.9 m^2 + 195 = 3.48 units



448.7 m^2 + 195 = 2.3 units



351.5 m^2 + 195 = 1.80 units
398.6 m^2 + 195 = 2.04 units
750.1 m^2 + 195 = 3.85 units



436.2 m^2 + 195 = 2.2 units